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# SUPPLEMENTAL GROUNDWATER DATA EVALUATION REPORT

## IRON HORSE PARK SUPERFUND SITE
## OPERABLE UNIT 4
## North Billerica, Massachusetts

**November 2008**

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**SUPPLEMENTAL GROUNDWATER DATA EVALUATION REPORT**
**IRON HORSE PARK SUPERFUND SITE - OPERABLE UNIT 4**
**NORTH BILLERICA, MASSACHUSETTS**



FIGURES



TABLES

## 1.0 INTRODUCTION

The U.S. Environmental Protection Agency, Region I, New England (USEPA) headquartered in Boston, Massachusetts contracted with Metcalf & Eddy, Inc. (M&E) of Wakefield, Massachusetts under EPA's Response Action Contract (RAC) to provide Remedial Investigation/Feasibility Study (RI/FS) services for Operable Unit 4 (OU-4) of the Iron Horse Park Superfund Site in North Billerica, Massachusetts (the site; Figure 1-1). OU-4 addresses residual groundwater, surface water, and sediment contamination following the source control measures that will be implemented for Operable Unit 3 (OU-3). In September 2006, M&E prepared a Groundwater Data Evaluation Report (M&E, 2006) to present the results of a sampling event performed in late 2005/early 2006. This report was prepared as a supplement to the Groundwater Data Evaluation Report (M&E, 2006) and provides further details/evaluations of the groundwater data presented in the September 2006 report. The reader should refer to the 2006 report for site history, background, and full presentation of the data. Specific objectives of this report are to

- summarize current (2005/2006) contaminant distribution compared to historic (1995) data, based on areas of concern (AOCs) defined previously in the OU-3 RI (M&E, 1997);
- evaluate contaminant distribution and trends, as well as contaminant fate and transport, particularly related to modeling performed in the OU-3 FS (M&E, 2004); and
- prepare figures depicting the areas of concern and notable data trends.

## 2.0 PRELIMINARY REMEDIATION GOALS

Under a separate task, M&E previously prepared a Supplemental Human Health Risk Assessment (HHRA) for OU-4 (M&E, 2008) to evaluate risks and hazards to site receptors exposed to groundwater contaminant concentrations that were presented in the Groundwater Data Evaluation Report (M&E, 2006). Similar to the HHRA prepared as part of the OU-3 RI (M&E, 1997), carcinogenic risks and non-carcinogenic hazards were determined to exceed EPA risk criteria for multiple analytes. Based on results presented in the Supplemental HHRA, revised preliminary remediation goals (PRGs) for groundwater were calculated for site

contaminants of concern (COCs). Discussion of PRG development will be presented in the forthcoming FS. Table 2-1 presents the current PRGs for site COCs in groundwater. These PRGs were used as benchmarks during this supplemental evaluation of contaminant distribution and trends.

## 3.0 CONTAMINANT DISTRIBUTION AND TRENDS

This section reviews groundwater contaminant distribution both sitewide and within seven source AOCs at the site: B&M Railroad Landfill, RSI Landfill, Old B&M Oil/Sludge Recycling Area, B&M Locomotive Shop Disposal Areas, Contaminated Soils Area, Asbestos Landfill, and the Asbestos Lagoons (Figure 3-1). Groundwater was collected from 60 monitoring wells site-wide during the 2005/2006 investigation. As part of the OU-3 RI in 1997, groundwater samples were collected from 78 monitoring wells. All groundwater analytical data from the 2005/2006 investigation and a comparison with historical sampling data are tabulated in Tables 4-1 and 4-2 of the Groundwater Data Evaluation Report (M&E, 2006). For this report, the sampling results were evaluated based on AOC and flow zone (overburden or bedrock). Table 3-1 presents the wells sampled in 1995 and those sampled in 2005/2006 split up by AOC. It should be noted that the distribution of wells among AOCs shown in Table 3-1 is different than what was presented in the OU-3 RI report (M&E, 1997) due to consideration of potential cleanup options. Furthermore, some wells associated with an AOC may actually be upgradient or sidegradient to an AOC.

A summary of PRG exceedances in all wells sampled in 2005/2006 is provided in Table 3-2. Figures 3-2 and 3-3 present these PRG exceedances broken down by overburden and bedrock flow zones, respectively. A total of 42 common monitoring wells were sampled during both RI sampling events in 1995 and during the 2005/2006 sampling round, with 30 wells screened in the overburden and 12 wells screened in bedrock. Table 3-3 presents a comparison of 1995 and 2005/2006 sampling results when evaluated against current PRGs.

Similar to historical monitoring results, arsenic and manganese PRG exceedances were noted in every AOC across the entire site in the 2005/2006 sampling results. Most metals concentrations

were of similar magnitude to historical results, and it should be noted that the OU-3 FS report indicated that attainment of cleanup goals for metals at the site could take a significant number of years (estimated to be > 200; M&E, 2004).

During the 2005/2006 investigation chlorinated VOCs were detected in wells in every AOC, except the B&M Locomotive Shop Disposal Areas (A&B). However, exceedances of PRGs for chlorinated VOCs were noted in less than 20 percent of all wells sampled site-wide. Chlorinated VOCs exceeding PRGs include 1,2-dichloroethane (1,2-DCA), 1,4-dichlorobenzene, carbon tetrachloride, cis-1,3-dichloropropene, tetrachloroethene (PCE), and trichloroethene (TCE). Based on the carbon tetrachloride concentrations in MW-202S (120 ug/L), OW-38 (37 ug/L) and OW-20 (7.8 ug/L), along with the groundwater flow direction estimated in 2006 (see Figure 3-2), it is possible that the detections are related.

One semi-volatile organic compound (SVOC), bis(2-chloroethyl)ether), and one pesticide, dieldrin, were detected in groundwater samples collected during the 2005/2006 investigation at concentrations that exceed risk-based PRGs. These exceedances occurred in newly-installed wells associated with the Asbestos Landfill and its vicinity (including upgradient locations). No SVOCs or pesticides were found to exceed PRGs in the samples collected during the RI sampling events. However, improved analytical quantification may explain this occurrence, as many more SVOCs were detected in 2005/2006 compared to 1995.

Benzene was detected at a concentration above the PRG in two locations associated with the Asbestos Landfill during the 2005/2006 investigation: OW-08 (59 ug/L) and MW-307S (6.6 ug/L). Benzene was detected at a higher concentration in OW-08 (345 ug/L) during the RI sampling events.

Table 3-4 presents the original rationale for selection of sampling locations during the 2005/2006 sampling event and a summary of the notable results/changes at those locations, grouped by AOC.

## 4.0 ESTIMATED REMEDIATION TIMES

Groundwater flow modeling was performed during preparation of the draft OU-4 FS (M&E, 2004, Appendix G) to estimate the period of time required to reach remedial action objectives (PRGs) for each remedial alternative. The USGS three-dimensional finite difference flow model, MODFLOW, was used for flow modeling, and the USGS particle-tracking model, MODPATH, was used for particle tracking. The site-specific model was developed using site information available from the remedial investigation (RI) such as boring logs, slug tests, water levels from monitoring wells and staff gauges, and stream seepage tests. Separate times to achieve remediation goals in overburden and in bedrock were computed for select organic and inorganic compounds for all FS alternatives evaluated. In addition, a second screening model (BIOSCREEN) that simulates remediation of organic contaminants through natural attenuation processes such as advection, dispersion, adsorption, and aerobic decay as well as anaerobic reactions was used to estimate the time to achieve remediation goals.

As part of this evaluation, changes in groundwater contaminant concentrations over ten years between the Remedial Investigation (1995) and the 2005/2006 data set were evaluated against the computed MODFLOW time estimates to achieve remediation goals for FS Alternatives #1 (No Action), #3 (Institutional Action) , and #5 (Limited Action), as well as the BIOSCREEN model estimates for monitored natural attenuation. The evaluation is presented in Table 4-1. Several contaminants no longer have PRGs, as maximum concentrations measured in 2005/2006 did not impose ingestion risk, including aldrin, bis(2-ethylhexyl)phthalate, 1,1,2,2-tetrachloroethane, and thallium, as demonstrated in the Supplemental HHRA (M&E, 2008).

The modeling estimates originally presented in the draft OU-4 FS were not intended to be exact values, but instead meant to provide a relative comparison of remediation time between remedial alternatives. For many of the organic contaminants originally modeled, significant reductions in concentrations were observed in the 10 years between sampling events. For nearly all estimates where the time to attain PRG for a contaminant in a specified area was less than 30 years, groundwater concentrations in 2005/2006 were below the PRG (e.g., 1,2-DCA in the B&M Railroad Landfill overburden and the RSI Landfill bedrock). For TCE in groundwater at the

B&M Railroad Landfill and for benzene at the RSI Landfill (in a well now considered actually related to the Asbestos Landfill), 60 percent and 80 percent reductions in concentrations were noted after 10 years, respectively, and estimated remediation times with natural attenuation will likely be attained in a shorter period than the times computed by BIOSCREEN (35 years for TCE in B&M Railroad Landfill and 54 years for benzene at the RSI Landfill/Asbestos Landfill).

Some notably significant differences in estimates can be attributed to the conservative methods used during the original evaluation. For example, a contaminant concentration detected in a well downgradient from an AOC could have been assumed to also exist at the upgradient edge of the AOC. The time estimates were based on that concentration traveling through the AOC to get to the monitoring location where the original detection was found. However, if the contaminant was actually released only near the downgradient edge of the AOC, the results could be significantly different. Another scenario to be considered involves the non-homogeneous nature of the source areas. Multiple contaminant release locations in a landfill may result in contaminant reduction followed by an increase at a later date. Overall, the model results showed that organics results may have been conservative, but that arsenic and manganese results are still appropriately high, as most locations had similar-magnitude concentrations and some locations even had concentration increases.

Lastly, the model information was reviewed during the supplemental evaluation. The model efforts used were reasonable and it is not likely that a new or updated version(s) would yield changes in the results or uncertainties associated with it.

## 5.0 REFERENCES

Metcalf & Eddy (M&E). 1997. Remedial Investigation Final Report - Iron Horse Park Superfund Site, 3rd Operable Unit, North Billerica, MA. Report prepared for the U.S. Environmental Protection Agency. September 1997.

Metcalf & Eddy (M&E). 2004. Feasibility Study Final Report, Iron Horse Park Superfund Site, 3rd Operable Unit, North Billerica, Massachusetts. June 2004.

Metcalf & Eddy (M&E). 2006. Groundwater Data Evaluation Report, Iron Horse Park Superfund Site, Operable Unit 4, North Billerica, Massachusetts. September 2006.

Metcalf & Eddy (M&E). 2008. Supplemental Human Health Risk Assessment, Iron Horse Park Superfund Site, Operable Unit 4, North Billerica, Massachusetts. February 2008.

United States Environmental Protection Agency (USEPA). 2006. *Statement of Work, Iron Horse Park OU4 RI/FS, Task Order 10, 0010-RI-CO-0157*. September 2004.

# FIGURES

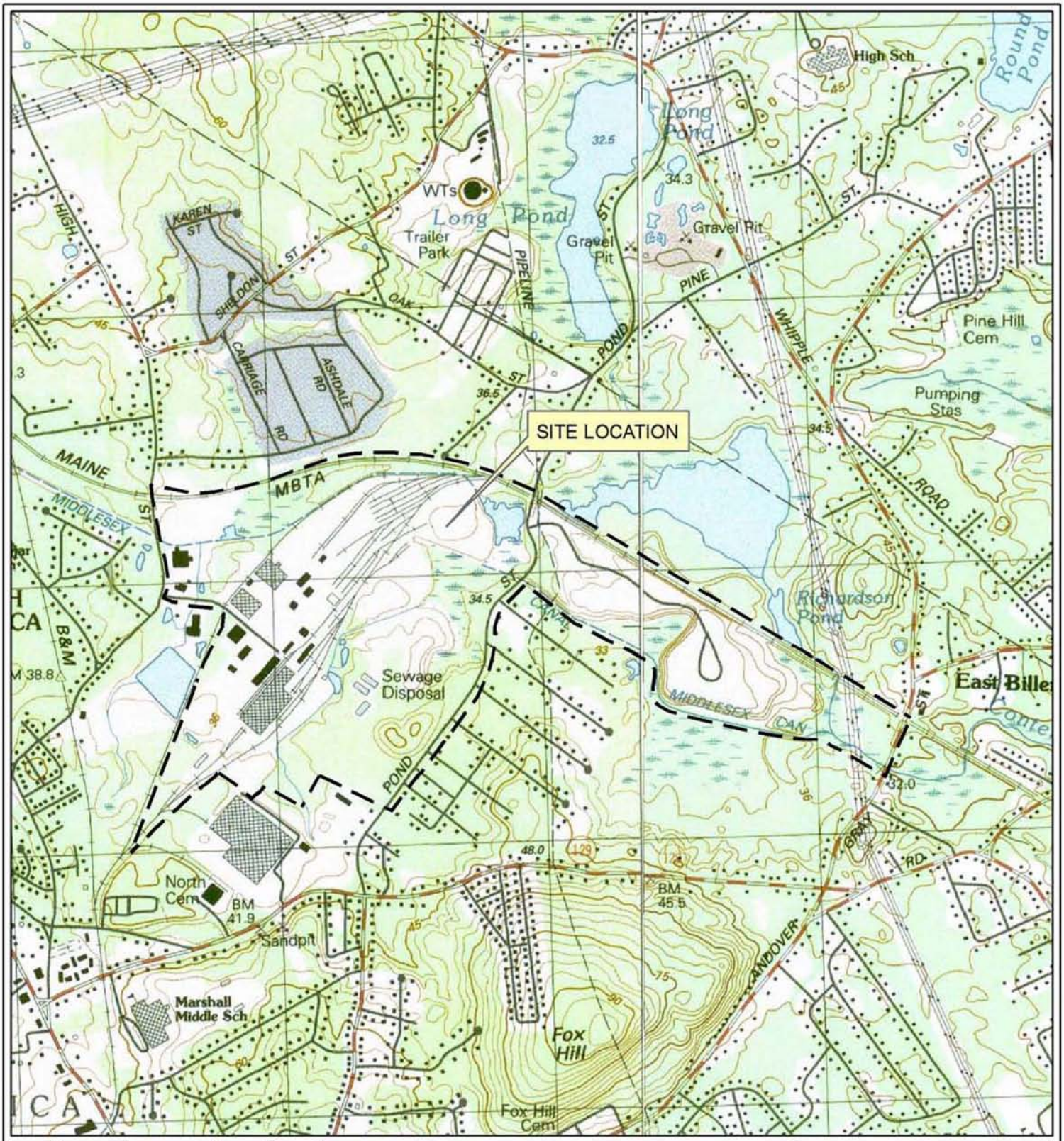


**FIGURE 1-1**
**SITE LOCUS**

GEOGRAPHICAL LOCATION
OF THE IRON HORSE PARK
SUPERFUND SITE
North Billerica, Massachusetts

Source: MassGIS

N
W E
S

1:20,000

0 500 1,000 2,000
Feet

METCALF & EDDY | AECOM

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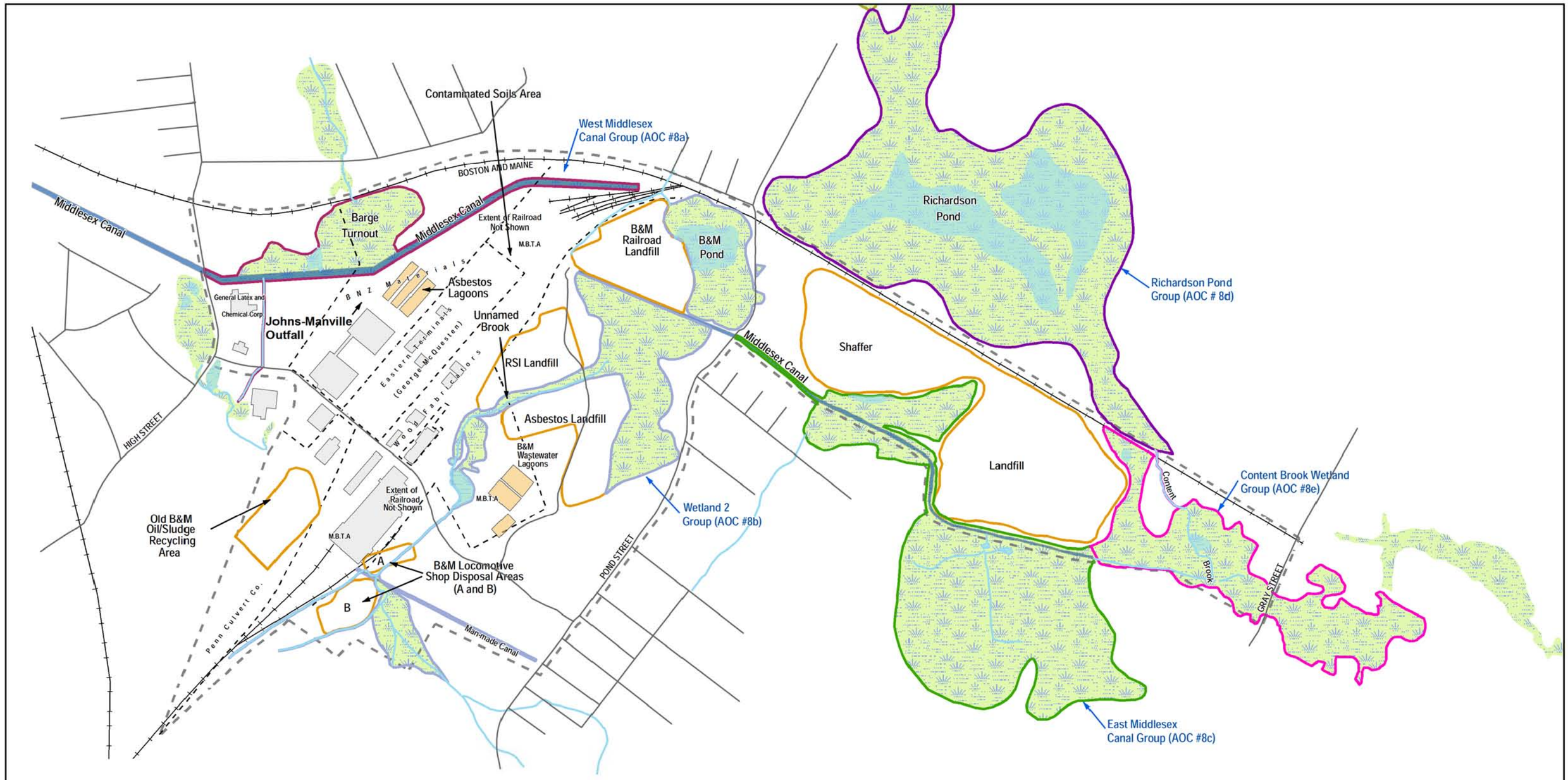


## LEGEND

- Property Boundary
- Site Boundary
- Roads
- Railroad
- Disposal Area Boundary
- Surface Water
- Wetlands
- Lagoon
- Building
- Content Brook Wetland Group
- East Middlesex Canal Group
- Richardson Pond Group
- West Middlesex Canal Group
- Wetland 2 Group

N, W, E, S

800 400 0 800
Feet

Locations for all features area approximate.
Extent of wetland and surface waters are limited to areas confirmed during wetlands reconnaissance on July 15, 1993 and November 8, 1994

Source: MassGIS, Commonwealth of Massachusetts
Executive Office of Environmental Affairs

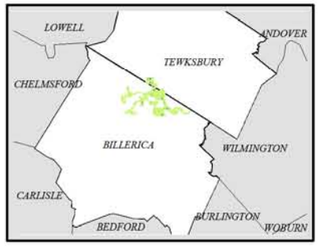


**FIGURE 3-1**

**SITE MAP**

Iron Horse Park Superfund Site
4th Operable Unit
North Billerica, MA

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BURNHAM ROAD

BOSTON AND MAINE

Middlesex Canal

Middlesex Canal

Extent of Railroad Not Shown

Asbestos Lagoons

Johns-Manville Outfall

B&M Railroad Landfill

B&M Pond

RSI Landfill

Asbestos Landfill

Shaffer

Middlesex Canal

HIGH STREET

POND STREET

ACCESS ROAD

Old B&M Oil/Sludge Recycling Area

Extent of Railroad Not Shown

Wetland 2 Group (AOC #8b)

Man-made Canal

B&M Locomotive Shop Disposal Areas (A and B)

A

B

OW-10, OW-12

OW-20

OW-35

MW-214S

MW-01A, -01B, -01C

OW-50, OW-51

MW-213S, D

MW-304D

MW-208S, D

MW-211S, D

OW-02

MW-212D

MW-210S

OW-38

OW-07, OW-08

MW-305S, D

OW-25, OW-26

MW-307S, D

MW-306S

MW-203S, D

MW-302S

MW-202S, D

MW-303S

MW-301S, D

MW-206S, D

MW-205S

MW-204S

107 108 109 110 111 112 113 114 115 116 117 118 119 120

## Legend

- Road
- Railroad
- Stream
- Fence
- Disposal Area Boundary
- Surface Water
- Wetland
- Lagoon
- Building

**Groundwater Contours**

- Elevation
- Inferred Elevation
- Well - Overburden

**PRG Exceedance**

- Pesticides
- CVOC
- BTEX
- SVOCs
- Metals — Only the metals manganese and/or arsenic

Large Box Indicates Concentration is >10 Times Greater Than PRG

N

0 125 250 500 750 1,000

Scale in Feet

Iron Horse Park Superfund Site
3rd Operable Unit
North Billerica, MA

**FIGURE 3-2**
**PRG EXCEEDANCES IN OVERBURDEN GROUNDWATER 2005/2006**

Locations for All Features Shown are Approximate. Extent of Wetland and Surface Waters are limited to Areas Confirmed During Wetlands Reconnaissance on July 15, 1993 and November 8, 1994.

METCALF & EDDY | AECOM

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BURNHAM ROAD

BOSTON AND MAINE

Middlesex Canal

Middlesex Canal

Extent of Railroad Not Shown

Asbestos Lagoons

OW-09

MW-209B

MW-304B

Johns-Manville Outfall

MW-208B

OW-37

MW-207B

MW-203B

MW-202B

Old B&M Oil/Sludge Recycling Area

MW-301B

HIGH STREET

Extent of Railroad Not Shown

A

B

B&M Locomotive Shop Disposal Areas (A and B)

Man-made Canal

RSI Landfill

Asbestos Landfill

B&M Railroad Landfill

B&M Pond

MW-215B

MW-01

OW-49

MW-213B

OW-01

MW-212B

MW-308B

MW-307B

Shaffer

Middlesex Canal

ACCESS ROAD

POND STREET

Wetland 2 Group (AOC #8b)

109

110

111

112

113

114

115

108

## Legend

- Road
- Railroad
- Stream
- Fence
- Disposal Area Boundary
- Surface Water
- Wetland
- Lagoon
- Building
- Well - Bedrock

**Groundwater Contours**

- Elevation
- Inferred Elevation

**PRG Exceedance**

- Pesticides
- CVOC
- BTEX
- SVOCs
- Metals — Only the metals manganese and/or arsenic

Large Box Indicates Concentration is >10 Times Greater Than PRG

0 125 250 500 750 1,000

Scale in Feet

Iron Horse Park Superfund Site
3rd Operable Unit
North Billerica, MA

**FIGURE 3-3**
**PRG EXCEEDANCES IN BEDROCK GROUNDWATER**
**2005/2006**

Locations for All Features Shown are Approximate.
Extent of Wetland and Surface Waters are limited to Areas Confirmed During Wetlands Reconnaissance on July 15, 1993 and November 8, 1994.

METCALF & EDDY | AECOM

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# TABLES

## TABLE 2-1. HUMAN HEALTH PRELIMINARY REMEDIATION GOALS (PRGs)

| Media/ Scenario | COC | Maximum Detection | Selected PRG | Basis | Max. Detect > PRG? |
|---|---|---|---|---|---|
| Groundwater - ug/L (Residential Scenario) | 1,2-Dichloroethane | 23 | 5 | MCL | Y |
| | 1,4-Dichlorobenzene | 7.5 | 5 | MMCL | Y |
| | Benzene | 59 | 5 | MCL | Y |
| | Carbon tetrachloride | 120 | 5 | MCL | Y |
| | cis-1,3-Dichloropropene | 8.6 | 0.49 | ILCR = $10^{-6}$ | Y |
| | Tetrachloroethene | 39 | 5 | MCL | Y |
| | Trichloroethene | 75 | 5 | MCL | Y |
| | Vinyl chloride | 0.74 | 2 | MCL | N |
| | Atrazine | 1.9 | 3 | MCL | N |
| | Bis(2-chloroethyl)ether | 0.7 | 0.5 | PQL | Y |
| | Dibenz(a,h)anthracene | 0.05 | 0.1 | PQL | N |
| | Dieldrin | 0.013 | 0.01 | PQL | Y |
| | Arsenic | 281 | 10 | MCL | Y |
| | Cadmium | 22.3 | 5 | MCL | Y |
| | Lead[1] | 29 | 15 | MCL | Y |
| | Manganese | 22600 | 300 | Health Adv. | Y |

Notes

COC - Contaminant of Concern

MCL - Maximum Contaminant Level

MMCL - Massachusetts Maximum Contaminant Level

ILCR - Incremental Lifetime Cancer Risk

PQL - Practical Quantification Limit; While it may be possible to achieve lower limits, those that are reasonably achievable have been included.

Health Adv. - Health Advisory on Manganese (EPA-822-R-04-003; January 2004)

1. Lead was identified in the Supplemental HHRA as a risk-driver, however, it was not quantitatively evaluated.

# TABLE 3-1
# SITE GROUNDWATER MONITORING WELLS

| Area of Concern | Monitoring Well | Flowzone | Dates Sampled | | | Notes |
|---|---|---|---|---|---|---|
| | | | Remedial Investigation | | 2005-06 | |
| Background | MW-200B | BR | March/April-95 | July-95 | -- | |
| | MW-200D | DOB | March/April-95 | July-95 | -- | |
| | MW-200S | SOB | March/April-95 | July-95 | -- | |
| | OW-05 | BR | March/April-95 | July-95 | -- | |
| | OW-06 | DOB | -- | -- | -- | |
| | OW-52 | BR | -- | -- | -- | |
| | OW-53 | DOB | -- | -- | -- | |
| B&M Railroad Landfill | MW-01 | BR | -- | -- | December-05 | |
| | MW-01A | DOB | March/April-95 | -- | December-05 | |
| | MW-01B | DOB | -- | -- | December-05 | |
| | MW-01C | SOB | March/April-95 | -- | December-05 | |
| | MW-213B | BR | March/April-95 | July-95 | December-05 | |
| | MW-213D | DOB | March/April-95 | July-95 | December-05 | |
| | MW-213S | SOB | March/April-95 | July-95 | December-05 | |
| | MW-214B | BR | March/April-95 | July-95 | -- | |
| | MW-214D | DOB | March/April-95 | July-95 | -- | |
| | MW-214S | SOB | March/April-95 | July-95 | December-05 | |
| | MW-215B | BR | March/April-95 | July-95 | -- | |
| | MW-215D | DOB | March/April-95 | July-95 | -- | |
| | MW-215B | BR | March/April-95 | July-95 | December-05 | |
| | OW-34 | BR | March/April-95 | July-95 | -- | Potentially Upgradient; Also see CSA |
| | OW-35 | SOB | March/April-95 | July-95 | December-05 | Potentially Upgradient; Also see CSA |
| | OW-36 | SOB | March/April-95 | July-95 | -- | Potentially Upgradient; Also see CSA |
| | OW-49 | BR | March/April-95 | July-95 | December-05 | |
| | OW-50 | DOB | March/April-95 | July-95 | December-05 | |
| | OW-51 | SOB | -- | -- | December-05 | |
| RSI Landfill | MW-207B | BR | March/April-95 | July-95 | December-05 | Potentially Upgradient; Also see Asbestos Landfill |
| | MW-210B | BR | March/April-95 | July-95 | | |
| | MW-210S | SOB | March/April-95 | July-95 | December-05 | |
| | MW-211B | BR | March/April-95 | July-95 | | |
| | MW-211D | DOB | March/April-95 | July-95 | December-05 | |
| | MW-211S | SOB | March/April-95 | July-95 | December-05 | |
| | MW-212B | BR | March/April-95 | July-95 | December-05 | |
| | MW-212D | DOB | March/April-95 | July-95 | December-05 | |
| | MW-212S | SOB | March/April-95 | July-95 | -- | |
| | OW-01 | BR | March/April-95 | July-95 | December-05 | |
| | OW-02 | DOB | March/April-95 | July-95 | December-05 | |
| | OW-03 | SOB | March/April-95 | July-95 | -- | |
| | OW-25 | DOB | March/April-95 | July-95 | December-05 | Potentially Upgradient; Also see Asbestos Landfill |
| | OW-26 | SOB | March/April-95 | July-95 | December-05 | Potentially Upgradient; Also see Asbestos Landfill |
| | OW-27 | SOB | March/April-95 | July-95 | -- | Potentially Upgradient; Also see Asbestos Landfill |

# TABLE 3-1
# SITE GROUNDWATER MONITORING WELLS

| Area of Concern | Monitoring Well | Flowzone | Dates Sampled | | | Notes |
|---|---|---|---|---|---|---|
| | | | Remedial Investigation | | 2005-06 | |
| Asbestos Landfill | MW-207B | BR | March/April-95 | July-95 | December-05 | Potentially Upgradient; Also see RSI Landfill |
| | MW-305D | DOB | -- | -- | February-06 | Upgradient |
| | MW-305S | SOB | -- | -- | February-06 | Upgradient |
| | MW-306S | SOB | -- | -- | February-06 | Upgradient |
| | MW-307B | BR | -- | -- | February-06 | |
| | MW-307D | DOB | -- | -- | February-06 | |
| | MW-307S | SOB | -- | -- | February-06 | |
| | MW-308B | BR | -- | -- | February-06 | |
| | OW-07 | DOB | March/April-95 | July-95 | February-06 | |
| | OW-08 | SOB | March/April-95 | July-95 | February-06 | |
| | OW-25 | DOB | March/April-95 | July-95 | December-05 | Potentially Upgradient; Also see RSI Landfill |
| | OW-26 | SOB | March/April-95 | July-95 | December-05 | Potentially Upgradient; Also see RSI Landfill |
| | OW-27 | SOB | March/April-95 | July-95 | -- | Potentially Upgradient; Also see RSI Landfill |
| Old B&M Oil/Sludge Recycling Area | MW-201B | BR | March/April-95 | July-95 | -- | Destroyed |
| | MW-201D | DOB | March/April-95 | July-95 | -- | Destroyed |
| | MW-201S | SOB | March/April-95 | July-95 | -- | Destroyed |
| | MW-202B | BR | March/April-95 | July-95 | February-06 | |
| | MW-202D | DOB | March/April-95 | July-95 | February-06 | |
| | MW-202S | SOB | March/April-95 | July-95 | February-06 | |
| | MW-203B | BR | March/April-95 | July-95 | December-05 | |
| | MW-203D | DOB | March/April-95 | July-95 | December-05 | |
| | MW-203S | SOB | March/April-95 | July-95 | December-05 | |
| | MW-301B | BR | -- | -- | February-06 | |
| | MW-301D | DOB | -- | -- | February-06 | |
| | MW-301S | SOB | -- | -- | February-06 | |
| | MW-302S | SOB | -- | -- | February-06 | |
| | MW-303S | SOB | -- | -- | February-06 | |
| | OW-17 | BR | March/April-95 | July-95 | -- | |
| | OW-18 | DOB | March/April-95 | July-95 | -- | |
| | OW-19 | SOB | March/April-95 | July-95 | -- | |
| | OW-37 | BR | March/April-95 | July-95 | December-05 | Also see CSA |
| | OW-38 | DOB | March/April-95 | July-95 | December-05 | Also see CSA |
| | OW-41 | DOB | March/April-95 | July-95 | -- | Destroyed |
| | OW-42 | SOB | March/April-95 | July-95 | -- | Destroyed |
| | OW-43 | SOB | March/April-95 | July-95 | -- | Destroyed |
| B&M Locomotive Shop Disposal Areas (A&B) | MW-204B | BR | March/April-95 | July-95 | -- | Slightly upgradient |
| | MW-204D | DOB | March/April-95 | July-95 | -- | Slightly upgradient |
| | MW-204S | SOB | March/April-95 | July-95 | December-05 | Slightly upgradient |
| | MW-205B | BR | March/April-95 | July-95 | -- | |
| | MW-205D | DOB | March/April-95 | July-95 | -- | |
| | MW-205S | SOB | March/April-95 | July-95 | December-05 | |
| | MW-206B | BR | March/April-95 | July-95 | -- | |
| | MW-206D | DOB | March/April-95 | July-95 | December-05 | |
| | MW-206S | SOB | March/April-95 | July-95 | December-05 | |
| | OW-39 | DOB | March/April-95 | July-95 | -- | |
| | OW-40 | SOB | March/April-95 | July-95 | -- | |

# TABLE 3-1
# SITE GROUNDWATER MONITORING WELLS

| Area of Concern | Monitoring Well | Flowzone | Dates Sampled | | | Notes |
|---|---|---|---|---|---|---|
| | | | Remedial Investigation | | 2005-06 | |
| Contaminated Soils Area (CSA) | OW-20 | DOB | March/April-95 | July-95 | December-05 | Potentially Downgradient; Also see Asbestos Lagoons |
| | OW-21 | SOB | March/April-95 | July-95 | -- | Potentially Downgradient; Also see Asbestos Lagoons |
| | OW-34 | BR | March/April-95 | July-95 | -- | Also see B&M Railroad Landfill |
| | OW-35 | SOB | March/April-95 | July-95 | December-05 | Also see B&M Railroad Landfill |
| | OW-36 | SOB | March/April-95 | July-95 | -- | Also see B&M Railroad Landfill |
| | OW-37 | BR | March/April-95 | July-95 | December-05 | Also see Old B&M Oil/Sludge Recycling Area |
| | OW-38 | DOB | March/April-95 | July-95 | December-05 | Also see Old B&M Oil/Sludge Recycling Area |
| | MW-208B | BR | March/April-95 | July-95 | December-05 | Also see Asbestos Lagoons |
| | MW-208D | DOB | March/April-95 | July-95 | December-05 | Also see Asbestos Lagoons |
| | MW-208S | SOB | March/April-95 | July-95 | December-05 | Also see Asbestos Lagoons |
| | MW-209B | BR | March/April-95 | July-95 | December-05 | Also see Asbestos Lagoons |
| | MW-304B | BR | -- | -- | February-06 | |
| | MW-304D | DOB | -- | -- | February-06 | |
| | MW-304S | SOB | -- | -- | February-06 | |
| Asbestos Lagoons | MW-208B | BR | March/April-95 | July-95 | December-05 | Upgradient; Also see CSA |
| | MW-208D | DOB | March/April-95 | July-95 | December-05 | Upgradient; Also see CSA |
| | MW-208S | SOB | March/April-95 | July-95 | December-05 | Upgradient; Also see CSA |
| | MW-209B | BR | March/April-95 | July-95 | December-05 | Sidegradient; Also see CSA |
| | OW-09 | BR | March/April-95 | July-95 | December-05 | |
| | OW-10 | DOB | March/April-95 | July-95 | December-05 | |
| | OW-11 | SOB | March/April-95 | July-95 | -- | |
| | OW-12 | SOB | March/April-95 | July-95 | December-05 | |
| | OW-13 | DOB | March/April-95 | July-95 | -- | Upgradient/Sidegradient |
| | OW-14 | SOB | March/April-95 | July-95 | -- | Upgradient/Sidegradient |
| | OW-20 | DOB | March/April-95 | July-95 | December-05 | Sidegradient; Also see CSA |
| | OW-21 | SOB | March/April-95 | July-95 | -- | Sidegradient; Also see CSA |

Notes
BR - Bedrock
DOB - Deep Overburden
SOB - Shallow Overburden

## TABLE 3-2. GROUNDWATER SAMPLING RESULTS - WINTER 2005-2006 - COMPARISON TO PRGs

| ANALYTE | PRG | MW-01 NX 12/14/2005 | MW-01A NX 12/15/2005 | MW-01B NX 12/14/2005 | MW-01C NX 12/14/2005 | MW-202B NX 2/20/2006 | MW-202D NX 2/20/2006 | MW-202S NX 2/20/2006 | MW-203B NX 12/15/2005 | MW-203D NX 12/15/2005 | MW-203S NX 12/15/2005 | MW-204S NX 12/15/2005 | MW-205S NX 12/15/2005 | MW-206D NX 12/13/2005 | MW-206S NX 12/13/2005 | MW-207B AV 12/13/2005 | MW-208B NX 12/16/2005 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VOCs (ug/L) | | | | | | | | | | | | | | | | | |
| 1,2-Dichloroethane | 5 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.095 J | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 2.6 | 1.7 |
| 1,4-Dichlorobenzene | 5 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 7.5 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.145 J | 0.5 U |
| Benzene | 5 | 0.5 UJ | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 1.1 J | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 UJ |
| Carbon Tetrachloride | 5 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.16 J | 0.5 U | 120 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.103 J | 0.5 U |
| cis-1,3-Dichloropropene | 0.49 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 UJ | 0.5 UJ | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U |
| Tetrachloroethene | 5 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.23 J | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 12 | 0.5 U |
| Trichloroethene | 5 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 9.05 | 0.5 U |
| Vinyl Chloride | 2 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U |
| SVOCs (ug/L) | | | | | | | | | | | | | | | | | |
| Atrazine | 3 | 1 U | 0.19 J | 1.1 U | 1 U | -- R | 1.9 J | -- R | 1.1 U | 0.27 J | 1 U | 1.1 U | 1.1 U | 1 U | 1 U | 0.255 J | 1 U |
| Bis(2-chloroethyl)ether | 0.5 | 0.05 U | 0.53 U | 0.57 U | 0.05 U | 0.5 U | 0.5 U | 0.5 UJ | 0.57 U | 0.53 U | 0.52 U | 0.53 U | 0.53 U | 0.05 U | 0.05 U | 0.395 J | 0.52 U |
| Dibenz(a,h)anthracene | 0.1 | 0.1 U | 0.11 U | 0.11 U | 0.1 U | 0.1 U | 0.1 U | 0.1 UJ | 0.11 U | 0.11 U | 0.1 U | 0.11 U | 0.11 U | 0.1 U | 0.1 U | 0.1 U | 0.026 J |
| Pesticides/PCBs (ug/L) | | | | | | | | | | | | | | | | | |
| Dieldrin | 0.01 | NA | NA | NA | NA | NA | NA | 0.01 UJ | NA | NA | 0.01 UJ | NA | 0.01 U | NA | 0.01 U | 0.01 UJ | NA |
| Metals (ug/L) | | | | | | | | | | | | | | | | | |
| Arsenic | 10 | 4.3 | 5.8 | 0.21 J | 0.054 J | 3.5 | 0.5 U | 17.2 | 0.86 | 1.5 | 5.8 | 2.5 | 0.39 J | 0.25 J | 0.62 | 5.8 J | 4.2 |
| Cadmium | 5 | 7.1 | 1.8 | 22.3 | 0.15 J | 0.28 J | 0.063 J | 0.14 J | 0.65 J | 0.088 J | 1 U | 0.97 J | 0.11 J | 0.19 J | 0.59 J | 0.83 J | 1 U |
| Lead | 15 | 28.8 | 10.5 | 6 | 1 U | 0.83 J | 0.86 J | 0.58 J | 0.51 J | 0.36 J | 1 U | 7.4 | 6.3 | 1 U | 1 U | 5.5 J | 0.37 J |
| Manganese | 300 | 287 J | 93.9 J | 290 | 106 J | 81.8 | 12.2 | 220 | 29.7 J | 256 J | 1010 J | 22400 J | 397 J | 57.8 J | 532 J | 431 J | 281 |
| Previously Sampled?: | | N | Y | N | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |

Notes
NX - Normal Field Sample
AV - Average of Field Duplicates
PRG - Preliminary Remediatio Goal
Shaded values indicate exceedance of PRG
NA - Not Analyzed

## TABLE 3-2. GROUNDWATER SAMPLING RESULTS - WINTER 2005-2006 - COMPARISON TO PRGs

| ANALYTE | PRG | MW-208D NX 12/16/2005 | MW-208S NX 12/16/2005 | MW-209B NX 12/21/2005 | MW-210S NX 12/20/2005 | MW-211D NX 12/20/2005 | MW-211S NX 12/20/2005 | MW-212B NX 12/20/2005 | MW-212D AV 12/20/2005 | MW-213B NX 12/19/2005 | MW-213D NX 12/19/2005 | MW-213S AV 12/19/2005 | MW-214S NX 12/19/2005 | MW-215B NX 12/19/2005 | MW-301B NX 2/23/2006 | MW-301D NX 2/23/2006 | MW-301S NX 2/23/2006 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VOCs (ug/L) | | | | | | | | | | | | | | | | | |
| 1,2-Dichloroethane | 5 | 0.5 U | 0.5 U | 21 | 0.5 U | 0.5 U | 0.5 U | 1.6 | 0.5 U | 4.6 | 0.5 U | 0.5 UJ | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U |
| 1,4-Dichlorobenzene | 5 | 0.5 U | 0.5 U | 0.5 U | 2 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 UJ | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U |
| Benzene | 5 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 UJ | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U |
| Carbon Tetrachloride | 5 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 UJ | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U |
| cis-1,3-Dichloropropene | 0.49 | 0.5 U | 0.5 U | 0.5 U | 0.5 UJ | 0.5 UJ | 0.5 U | 0.5 U | 0.5 U | 0.5 UJ | 0.5 UJ | 0.5 UJ | 0.5 UJ | 0.5 U | 0.5 U | 0.5 U | 0.5 U |
| Tetrachloroethene | 5 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 UJ | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U |
| Trichloroethene | 5 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 16 | 4.8 | 0.5 UJ | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U |
| Vinyl Chloride | 2 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 UJ | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U |
| SVOCs (ug/L) | | | | | | | | | | | | | | | | | |
| Atrazine | 3 | 1.1 U | 1.1 U | -- R | 5 U | 5 U | 5 U | 5 U | 5 U | 1 U | 5 U | 5 U | 0.36 J | 1.1 U | -- R | -- R | -- R |
| Bis(2-chloroethyl)ether | 0.5 | 0.54 U | 0.56 U | 0.32 J | 0.66 UJ | 0.5 UJ | 0.82 UJ | 0.1 J | 0.51 UJ | 0.31 J | 0.5 UJ | -- R | 0.53 U | 0.57 U | 0.5 U | 0.5 U | 0.5 U |
| Dibenz(a,h)anthracene | 0.1 | 0.05 J | 0.05 J | 0.1 UJ | 0.13 UJ | 0.1 UJ | 0.16 UJ | 0.1 UJ | 0.1 UJ | 0.019 J | 0.1 UJ | 5 U | 0.024 J | 0.027 J | 0.1 U | 0.1 U | 0.1 U |
| Pesticides/PCBs (ug/L) | | | | | | | | | | | | | | | | | |
| Dieldrin | 0.01 | NA | NA | NA | NA | NA | 0.01 U | NA | NA | NA | NA | -- R | 0.01 UJ | NA | NA | NA | 0.01 UJ |
| Metals (ug/L) | | | | | | | | | | | | | | | | | |
| Arsenic | 10 | 0.11 J | 101 | 4.4 | 66.1 | 281 | 99.5 | 32.9 | 20.25 | 5.1 | 0.42 J | 1.7 | 88.8 | 4.2 | 2.7 | 7 | 22.1 |
| Cadmium | 5 | 0.1 J | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 0.079 J | 1.2 | 1 U | 0.075 J | 1 U | 0.088 J | 1 U | 0.061 J | 1 U |
| Lead | 15 | 1 UJ | 1.9 J | 1 U | 1 UJ | 1 U | 1 UJ | 0.37 J | 0.375 J | 17.3 J | 0.32 J | 3.35 J | 0.36 J | 0.37 J | 2.8 | 4.3 | 1 U |
| Manganese | 300 | 1690 | 1050 | 1290 | 2770 | 5140 | 1180 | 2770 | 1040.5 | 270 | 224 | 773.5 | 4550 | 30.7 | 130 | 238 | 599 |
| Previously Sampled?: | | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | N | N | N |

Notes
NX - Normal Field Sample
AV - Average of Field Duplicates
PRG - Preliminary Remediatio Goal
Shaded values indicate exceedance of PRG
NA - Not Analyzed

## TABLE 3-2. GROUNDWATER SAMPLING RESULTS - WINTER 2005-2006 - COMPARISON TO PRGs

| ANALYTE | PRG | MW-302S NX 2/20/2006 | MW-303S NX 2/20/2006 | MW-304B NX 2/21/2006 | MW-304D AV 2/21/2006 | MW-304S NX 2/21/2006 | MW-305D NX 2/21/2006 | MW-305S NX 2/21/2006 | MW-306S NX 2/23/2006 | MW-307B NX 2/22/2006 | MW-307D NX 2/22/2006 | MW-307S NX 2/22/2006 | MW-308B NX 2/22/2006 | OW-01 NX 12/20/2005 | OW-02 NX 12/20/2005 | OW-07 NX 2/22/2006 | OW-08 NX 2/22/2006 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VOCs (ug/L) | | | | | | | | | | | | | | | | | |
| 1,2-Dichloroethane | 5 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 4.8 | 0.5 U | 0.5 U | 23 | 11 | 0.5 U | 8.5 | 0.74 | 0.5 U | 0.54 U | 2.7 U |
| 1,4-Dichlorobenzene | 5 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.37 J | 0.5 U | 0.5 U | 0.5 U | 0.42 J | 0.5 U | 0.26 J | 0.5 U | 0.5 U | 0.5 U | 1.6 |
| Benzene | 5 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.29 J | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 6.6 J | 0.2 J | 0.5 U | 0.5 U | 0.5 U | 59 |
| Carbon Tetrachloride | 5 | 0.5 U | 0.39 J | 0.5 U | 0.5 U | 0.5 U | 0.23 J | 0.5 U | 0.5 U | 0.5 U | 0.22 J | 0.42 J | 0.27 J | 0.5 U | 0.5 U | 0.5 U | 0.36 J |
| cis-1,3-Dichloropropene | 0.49 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 1.2 J | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 8.6 |
| Tetrachloroethene | 5 | 0.5 U | 0.5 U | 0.5 U | 0.34 J | 0.085 J | 0.5 U | 1.6 | 0.5 U | 0.5 U | 0.26 J | 0.5 U | 0.26 J | 0.5 U | 0.5 U | 0.5 U | 0.5 U |
| Trichloroethene | 5 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.37 J | 0.4 J | 0.5 U | 0.5 U | 0.96 | 0.5 U | 75 | 1.5 | 0.5 U | 4.6 | 0.13 J |
| Vinyl Chloride | 2 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.66 | 0.74 | 0.5 U | 0.5 U | 0.5 U | 0.5 U |
| SVOCs (ug/L) | | | | | | | | | | | | | | | | | |
| Atrazine | 3 | -- R | -- R | -- R | -- R | -- R | -- R | -- R | -- R | -- R | -- R | -- R | -- R | 5 U | 5 UJ | -- R | -- R |
| Bis(2-chloroethyl)ether | 0.5 | 0.5 U | 0.5 U | 0.058 J | 0.5 U | 0.5 U | 0.55 | 0.059 J | 0.5 U | 0.53 | 0.7 | 0.5 U | 0.66 | 0.065 J | 0.58 UJ | 0.093 J | 0.5 U |
| Dibenz(a,h)anthracene | 0.1 | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.12 UJ | 0.12 UJ | 0.1 U | 0.1 U |
| Pesticides/PCBs (ug/L) | | | | | | | | | | | | | | | | | |
| Dieldrin | 0.01 | NA | NA | 0.01 UJ | 0.01 UJ | 0.01 UJ | 0.01 UJ | 0.013 | NA | NA | NA | NA | 0.01 UJ | NA | NA | 0.01 UJ | 0.01 UJ |
| Metals (ug/L) | | | | | | | | | | | | | | | | | |
| Arsenic | 10 | 1.1 | 16.1 | 6.4 | 0.56 | 0.5 U | 3.8 | 3.3 | 14.5 | 10.6 | 2.8 | 8.6 | 1.4 | 2.4 | 11.9 | 7.2 | 14.4 |
| Cadmium | 5 | 0.061 J | 1 U | 1 U | 0.0765 J | 0.082 J | 0.15 J | 1 U | 1 U | 1 U | 1 U | 1 U | 0.12 J | 0.18 J | 0.38 J | 1 U | 1 U |
| Lead | 15 | 2.5 | 7.9 | 0.16 J | 0.35 J | 1 U | 1 U | 1 U | 1 U | 0.13 J | 1 U | 0.12 J | 0.15 J | 1 UJ | 0.24 J | 0.25 J | 0.11 J |
| Manganese | 300 | 45.1 | 346 | 75.7 | 137.5 | 6.6 | 6440 | 1730 | 205 | 37.3 | 133 | 409 | 149 | 158 | 2320 | 2110 | 567 |
| Previously Sampled?: | | N | N | N | N | N | N | N | N | N | N | N | N | Y | Y | Y | Y |

Notes
NX - Normal Field Sample
AV - Average of Field Duplicates
PRG - Preliminary Remediatio Goal
Shaded values indicate exceedance of PRG
NA - Not Analyzed

**TABLE 3-2. GROUNDWATER SAMPLING RESULTS - WINTER 2005-2006 - COMPARISON TO PRGs**

| ANALYTE | PRG | OW-09 NX 12/15/2005 | OW-10 NX 12/15/2005 | OW-12 NX 12/15/2005 | OW-20 NX 12/21/2005 | OW-25 NX 12/13/2005 | OW-26 NX 12/13/2005 | OW-35 NX 12/21/2005 | OW-37 NX 12/21/2005 | OW-38 NX 12/21/2005 | OW-49 NX 12/14/2005 | OW-50 NX 12/14/2005 | OW-51 NX 12/14/2005 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VOCs (ug/L) | | | | | | | | | | | | | |
| 1,2-Dichloroethane | 5 | 2.6 | 2.6 | 0.5 U | 0.66 | 1.3 | 0.5 U | 0.5 U | 0.47 J | 0.5 U | 5 | 0.5 U | 0.5 U |
| 1,4-Dichlorobenzene | 5 | 0.32 J | 0.31 J | 0.5 U | 0.6 | 0.5 U | 0.27 J | 0.5 U | 0.5 U | 1.7 | 0.14 J | 0.5 U | 0.5 U |
| Benzene | 5 | 0.5 U | 0.5 U | 0.37 J | 0.26 J | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.63 | 0.5 U | 0.5 U | 0.5 U |
| Carbon Tetrachloride | 5 | 0.5 U | 0.5 U | 0.5 U | 7.8 J | 0.5 U | 0.5 U | 0.5 U | 0.56 | 37 | 0.5 U | 0.5 U | 0.5 U |
| cis-1,3-Dichloropropene | 0.49 | 0.5 U | 0.5 U | 0.5 UJ | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 UJ |
| Tetrachloroethene | 5 | 3.2 | 3.2 | 0.5 U | 39 | 4.4 | 0.5 U | 0.5 U | 1.3 | 14 | 0.5 U | 0.5 U | 0.5 U |
| Trichloroethene | 5 | 2.2 | 2.2 | 0.5 U | 7 J | 3.2 | 0.08 J | 0.5 U | 0.28 J | 2 | 7.8 | 0.18 J | 0.5 U |
| Vinyl Chloride | 2 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U |
| SVOCs (ug/L) | | | | | | | | | | | | | |
| Atrazine | 3 | 1.1 U | 0.13 J | 1.1 U | -- R | 0.28 J | 1 U | -- R | -- R | -- R | 1 U | 1 U | 1 U |
| Bis(2-chloroethyl)ether | 0.5 | 0.44 J | 0.058 J | 0.57 U | 0.5 UJ | 0.02 J | 0.11 J | 0.5 UJ | 0.5 UJ | 0.5 UJ | 0.21 J | 0.034 J | 0.058 J |
| Dibenz(a,h)anthracene | 0.1 | 0.11 U | 0.11 U | 0.11 U | 0.1 UJ | 0.1 U | 0.1 U | 0.1 UJ | 0.1 UJ | 0.1 UJ | 0.1 U | 0.1 U | 0.1 U |
| Pesticides/PCBs (ug/L) | | | | | | | | | | | | | |
| Dieldrin | 0.01 | 0.01 U | NA | NA | 0.01 U | NA | 0.01 U | 0.01 U | NA | NA | NA | NA | NA |
| Metals (ug/L) | | | | | | | | | | | | | |
| Arsenic | 10 | 1.5 | 0.25 J | 13.6 | 10.7 | 2 J | 24.7 | 8.3 | 7.4 | 8.1 | 0.48 J | 6.9 | 23.1 |
| Cadmium | 5 | 18.3 | 0.96 J | 0.051 J | 0.056 J | 1.3 J | 1 U | 1 U | 1 U | 0.41 J | 0.43 J | 0.18 J | 1 U |
| Lead | 15 | 6.1 J | 0.6 J | 1 UJ | 1 U | 10 U | 0.78 J | 0.73 J | 1 U | 1 U | 1 U | 1.1 | 1 U |
| Manganese | 300 | 22600 | 2820 | 82.2 | 3480 | 5970 J | 7.6 J | 327 | 1390 | 1700 | 516 J | 1350 J | 1470 J |
| Previously Sampled?: | | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | N |

Notes
NX - Normal Field Sample
AV - Average of Field Duplicates
PRG - Preliminary Remediatio Goal
Shaded values indicate exceedance of PRG
NA - Not Analyzed

## TABLE 3-3a. COMPARISON OF HISTORICAL PRG EXCEEDANCES IN GROUNDWATER BY AREA OF CONCERN - OVERBURDEN/BEDROCK COMBINED

Monitoring Wells Sampled During Both 1995 Remedial Investigation and 2005/06 Monitoring Rounds

| | | | 1995 Remedial Investigation Wells with One or More PRG Exceedances | | | | | | | | | | 2005-2006 Investigation Wells with One or More PRG Exceedances | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wells Sampled | # Wells Sampled | Total | cVOCs | | BTEX | | SVOCs | | Metals | | Pesticides | Total | cVOCs | | BTEX | | SVOCs | | Metals | | Pesticides |
| B&M Railroad Landfill | MW-01A, MW-01C, MW-213S, MW-213D, MW-213B, MW-214S, MW-215B, OW-35, OW-49, OW-50 | 10 | 7 | 3 | MW-213B, MW-213D, OW-49 | 0 | No Exceedances | 0 | No Exceedances | 6 | MW-213S, MW-213D, MW-214S, OW-35, OW-49, OW-50 | 0 No Exceedances | 6 | 2 | MW-213B, OW-49 | 0 | No Exceedances | 0 | No Exceedances | 6 | MW-213S, MW-213B, MW-214S, OW-35, OW-49, OW-50 | 0 No Exceedances |
| RSI Landfill | MW-207B, MW-210S, MW-211S, MW-211D, MW-212D, MW-212B, OW-01, OW-02, OW-25, OW-26 | 10 | 10 | 2 | MW-207B, OW-01 | 0 | No Exceedances | 0 | No Exceedances | 8 | MW-210S, MW-211S, MW-211D, MW-212D, MW-212B, OW-02, OW-25, OW-26 | 0 No Exceedances | 9 | 1 | MW-207B | 0 | No Exceedances | 0 | No Exceedances | 9 | MW-207B, MW-210S, MW-211S, MW-211D, MW-212D, MW-212B, OW-02, OW-25, OW-26 | 0 No Exceedances |
| Asbestos Landfill | MW-207B, OW-07, OW-08, OW-25, OW-26 | 5 | 5 | 2 | MW-207B, OW-07 | 1 | OW-08 | 0 | No Exceedances | 4 | OW-07, OW-08, OW-25, OW-26 | 0 No Exceedances | 5 | 2 | MW-207B, OW-08 | 1 | OW-08 | 0 | No Exceedances | 5 | MW-207B, OW-07, OW-08, OW-25, OW-26 | 0 No Exceedances |
| Contaminated Soils Area | MW-208S, MW-208D, MW-208B, MW-209B, OW-20, OW-35, OW-37, OW-38 | 8 | 8 | 1 | MW-209B | 0 | No Exceedances | 0 | No Exceedances | 8 | MW-208S, MW-208D, MW-208B, MW-209B, OW-20, OW-35, OW-37, OW-38 | 0 No Exceedances | 7 | 3 | MW-209B, OW-20, OW-38 | 0 | No Exceedances | 0 | No Exceedances | 7 | MW-208S, MW-208D, MW-209B, OW-20, OW-35, OW-37, OW-38 | 0 No Exceedances |
| B&M Locomotive Shop Disposal Areas (A&B) | MW-204S, MW-205S, MW-206S, MW-206D | 4 | 2 | 0 | No Exceedances | 0 | No Exceedances | 0 | No Exceedances | 2 | MW-204S, MW-205S | 0 No Exceedances | 3 | 0 | No Exceedances | 0 | No Exceedances | 0 | No Exceedances | 3 | MW-204S, MW-205S, MW-206S | 0 No Exceedances |
| Old B&M Oil/Sludge Recycling Area | MW-202S, MW-202D, MW-202B, MW-203S, MW-203D, MW-203B, OW-37, OW-38 | 8 | 4 | 0 | No Exceedances | 0 | No Exceedances | 0 | No Exceedances | 4 | MW-203D, MW-203S, OW-37, OW-38 | 0 No Exceedances | 4 | 2 | MW-202S, OW-38 | 0 | No Exceedances | 0 | No Exceedances | 4 | MW-202S, MW-203S, OW-37, OW-38 | 0 No Exceedances |
| Asbestos Lagoons | MW-208S, MW-208D, MW-208B, MW-209B, OW-09, OW-10, OW-12, OW-20 | 8 | 8 | 1 | MW-209B | 0 | No Exceedances | 0 | No Exceedances | 8 | MW-208S, MW-208D, MW-208B, MW-209B, OW-09, OW-10, OW-12, OW-20 | 0 No Exceedances | 7 | 2 | MW-209B, OW-20 | 0 | No Exceedances | 0 | No Exceedances | 7 | MW-208S, MW-208D, MW-209B, OW-09, OW-10, OW-12, OW-20 | 0 No Exceedances |
| TOTAL [1] | | 53 | 44 | 9 | | 1 | | 0 | | 40 | | 0 | 41 | 12 | | 1 | | 0 | | 41 | | 0 |

## TABLE 3-3b. COMPARISON OF HISTORICAL PRG EXCEEDANCES IN GROUNDWATER BY AREA OF CONCERN - OVERBURDEN

Overburden Wells Sampled During Both 1995 Remedial Investigation and 2005/06 Monitoring Rounds

| | | | 1995 Remedial Investigation Wells with One or More PRG Exceedances | | | | | | | | | | 2005-2006 Investigation Wells with One or More PRG Exceedances | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wells Sampled | # Wells Sampled | Total | cVOCs | | BTEX | | SVOCs | | Metals | | Pesticides | Total | cVOCs | | BTEX | | SVOCs | | Metals | | Pesticides |
| B&M Railroad Landfill | MW-01A, MW-01C, MW-213S, MW-213D, MW-214S, OW-35, OW-50 | 7 | 5 | 1 | MW-213D | 0 | No Exceedances | 0 | No Exceedances | 5 | MW-213S, MW-213D, MW-214S, OW-35, OW-50 | 0 No Exceedances | 4 | 0 | No Exceedances | 0 | No Exceedances | 0 | No Exceedances | 4 | MW-213S, MW-214S, OW-35, OW-50 | 0 No Exceedances |
| RSI Landfill | MW-210S, MW-211S, MW-211D, MW-212D, OW-02, OW-25, OW-26 | 7 | 7 | 0 | No Exceedances | 0 | No Exceedances | 0 | No Exceedances | 7 | MW-210S, MW-211S, MW-211D, MW-212D, OW-02, OW-25, OW-26 | 0 No Exceedances | 7 | 0 | No Exceedances | 0 | No Exceedances | 0 | No Exceedances | 7 | MW-210S, MW-211S, MW-211D, MW-212D, OW-02, OW-25, OW-26 | 0 No Exceedances |
| Asbestos Landfill | OW-07, OW-08, OW-25, OW-26 | 4 | 4 | 1 | OW-07 | 1 | OW-08 | 0 | No Exceedances | 4 | OW-07, OW-08, OW-25, OW-26 | 0 No Exceedances | 4 | 1 | OW-08 | 1 | OW-08 | 0 | No Exceedances | 4 | OW-07, OW-08, OW-25, OW-26 | 0 No Exceedances |
| Contaminated Soils Area | MW-208S, MW-208D, OW-20, OW-35, OW-38 | 5 | 5 | 0 | No Exceedances | 0 | No Exceedances | 0 | No Exceedances | 5 | MW-208S, MW-208D, OW-20, OW-35, OW-38 | 0 No Exceedances | 5 | 2 | OW-20, OW-38 | 0 | No Exceedances | 0 | No Exceedances | 5 | MW-208S, MW-208D, OW-20, OW-35, OW-38 | 0 No Exceedances |
| B&M Locomotive Shop Disposal Areas (A&B) | MW-204S, MW-205S, MW-206S, MW-206D | 4 | 2 | 0 | No Exceedances | 0 | No Exceedances | 0 | No Exceedances | 2 | MW-204S, MW-205S | 0 No Exceedances | 3 | 0 | No Exceedances | 0 | No Exceedances | 0 | No Exceedances | 3 | MW-204S, MW-205S, MW-206S | 0 No Exceedances |
| Old B&M Oil/Sludge Recycling Area | MW-202S, MW-202D, MW-203S, MW-203D, OW-38 | 5 | 3 | 0 | No Exceedances | 0 | No Exceedances | 0 | No Exceedances | 3 | MW-203D, MW-203S, OW-38 | 0 No Exceedances | 3 | 2 | MW-202S, OW-38 | 0 | No Exceedances | 0 | No Exceedances | 3 | MW-202S, MW-203S, OW-38 | 0 No Exceedances |
| Asbestos Lagoons | MW-208S, MW-208D, OW-10, OW-12, OW-20 | 5 | 5 | 0 | No Exceedances | 0 | No Exceedances | 0 | No Exceedances | 5 | MW-208S, MW-208D, OW-10, OW-12, OW-20 | 0 No Exceedances | 5 | 1 | OW-20 | 0 | No Exceedances | 0 | No Exceedances | 5 | MW-208S, MW-208D, OW-10, OW-12, OW-20 | 0 No Exceedances |
| TOTAL [1] | | 37 | 31 | 2 | | 1 | | 0 | | 31 | | 0 | 31 | 6 | | 1 | | 0 | | 31 | | 0 |

## TABLE 3-3c. COMPARISON OF HISTORICAL PRG EXCEEDANCES IN GROUNDWATER BY AREA OF CONCERN - BEDROCK

Bedrock Wells Sampled During Both 1995 Remedial Investigation and 2005/06 Monitoring Rounds

| | | | 1995 Remedial Investigation Wells with One or More PRG Exceedances | | | | | | | | | | 2005-2006 Investigation Wells with One or More PRG Exceedances | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wells Sampled | # Wells Sampled | Total | cVOCs | | BTEX | | SVOCs | | Metals | | Pesticides | Total | cVOCs | | BTEX | | SVOCs | | Metals | | Pesticides |
| B&M Railroad Landfill | MW-213B, MW-215B, OW-49 | 3 | 2 | 2 | MW-213B, OW-49 | 0 | No Exceedances | 0 | No Exceedances | 1 | OW-49 | 0 | No Exceedances | 2 | 2 | MW-213B, OW-49 | 0 | No Exceedances | 0 | No Exceedances | 2 | MW-213B, OW-49 | 0 | No Exceedances |
| RSI Landfill | MW-207B, MW-212B, OW-01 | 3 | 3 | 2 | MW-207B, OW-01 | 0 | No Exceedances | 0 | No Exceedances | 1 | MW-212B | 0 | No Exceedances | 2 | 1 | MW-207B | 0 | No Exceedances | 0 | No Exceedances | 2 | MW-207B, MW-212B | 0 | No Exceedances |
| Asbestos Landfill | MW-207B | 1 | 1 | 1 | MW-207B | 0 | No Exceedances | 0 | No Exceedances | 0 | No Exceedances | 0 | No Exceedances | 1 | 1 | MW-207B | 0 | No Exceedances | 0 | No Exceedances | 1 | MW-207B | 0 | No Exceedances |
| Contaminated Soils Area | MW-208B, MW-209B, OW-37 | 3 | 3 | 1 | MW-209B | 0 | No Exceedances | 0 | No Exceedances | 3 | MW-208B, MW-209B, OW-37 | 0 | No Exceedances | 2 | 1 | MW-209B | 0 | No Exceedances | 0 | No Exceedances | 2 | MW-209B, OW-37 | 0 | No Exceedances |
| B&M Locomotive Shop Disposal Areas (A&B) | No bedrock wells sampled for this AOC during both events | -- | -- | | -- | | -- | | -- | | -- | | -- | -- | | -- | | -- | | -- | | -- | | -- |
| Old B&M Oil/Sludge Recycling Area | MW-202B, MW-203B, OW-37 | 3 | 1 | 0 | No Exceedances | 0 | No Exceedances | 0 | No Exceedances | 1 | OW-37 | 0 | No Exceedances | 1 | 0 | No Exceedances | 0 | No Exceedances | 0 | No Exceedances | 1 | OW-37 | 0 | No Exceedances |
| Asbestos Lagoons | MW-208B, MW-209B, OW-09 | 3 | 3 | 1 | MW-209B | 0 | No Exceedances | 0 | No Exceedances | 3 | MW-208B, MW-209B, OW-09 | 0 | No Exceedances | 2 | 1 | MW-209B | 0 | No Exceedances | 0 | No Exceedances | 2 | MW-209B, OW-09 | 0 | No Exceedances |
| TOTAL [1] | | 16 | 13 | 7 | | 0 | | 0 | | 9 | | 0 | | 10 | 6 | | 0 | | 0 | | 10 | | 0 | |

Notes

1. Note that some wells may be associated with multiple Areas of Concern (AOCs), so the totals may reflect that duplication.

cVOCs - Chlorinated volatile organic compounds

BTEX - Benzene, toluene, ethylbenzene, and xylene

SVOCs - Semivolatile organic compounds

PRG - Preliminary remediation goal

# TABLE 3-4. NOTABLE DETECTIONS AND OBSERVATIONS OF WINTER 2005-2006 GROUNDWATER MONITORING ROUND

| Well ID | Original Selection Rationale (based on historical monitoring data) | Notable Detections and Observations of Winter 2005-2006 Monitoring Round |
|---|---|---|
| **RSI Landfill** | | |
| MW-207B | Location upgradient of Asbestos Landfill; historical detections of 1,1,1-TCA and 1,2-DCA | • Miscellaneous VOCs detected<br>• TCE and PCE above PRGs;<br>• 1,1,1-TCA detected at 2.3 ug/L, which is just below the historical detection of 3 ug/L;<br>• 1,2-DCA detected at 2.6 ug/L which is less than half of historical results;<br>• Mn above PRG<br>• 1,4-dioxane at 1.3 ug/L |
| MW-210S | Metal concentrations higher than most other site locations | • Similar to historical results<br>• As and Mn above PRGs |
| MW-211D | Metal concentrations higher than most other site locations | • Similar to historical results<br>• As and Mn above PRGs |
| MW-211S | Pesticides, Mn, and As concentrations higher than most other site locations | • No organics detected<br>• As and Mn reduced in magnitude compared to historical results |
| MW-212B | Mn detected above the PRG | • As and Mn above PRGs |
| MW-212D | 1,1,2,2-Tetrachloroethane and manganese detected above the PRGs | • 1,1,2,2-Tetrachloroethane now ND<br>• As and Mn above PRGs |
| OW-01 | TCE detected at the MCL/PRG (5 ug/L) | • TCE now below PRG (1.5 ug/L)<br>• Detections of 1,1-DCA (1.4 ug/L) and 1,2-DCA (0.74 ug/L) – Below PRG |
| OW-02 | Mn detected above the PRG | • Mn detected at the same magnitude;<br>• As above PRG |
| OW-25 | Tl and Mn detected above the PRGs | • Miscelleanous VOCs detected<br>• TCE and PCE just below PRGs (3.2 and 4.4 ug/L, respectively)<br>• Mn above PRG;<br>• Tl was ND, but the DL was elevated (5 ug/L) above the PRG of 2 ug/L |
| OW-26 | Pesticides detected | • Pesticides now ND<br>• As above PRG |
| **B&M Locomotive Shop Disposal Areas (A&B)** | | |
| MW-204S | 1,1,2,2-Tetrachloroethane and Mn detected above the PRGs | • Acenaphthene only organic detected;<br>• Mn detected well above the PRG (22400 ug/L) |
| MW-205S | Check the surficial aquifer in the Locomotive Shop Disposal Areas | • Acenaphthene and phenanthrene only organics detected<br>• Mn above PRG |
| MW-206D | Check the deep aquifer in the Locomotive Shop Disposal Areas | • 1,2-Dichloropropane and MTBE only organics detected<br>• No PRG exceedances |
| MW-206S | Check the surficial aquifer in the Locomotive Shop Disposal Areas | • MTBE only organic detected<br>• Mn above PRG |

| Well ID | Original Selection Rationale (based on historical monitoring data) | Notable Detections and Observations of Winter 2005-2006 Monitoring Round |
|---|---|---|
| **Contaminated Soils Area (CSA)** | | |
| OW-20 | Pesticides detected and Mn detected above the PRG | • Miscelleanous VOCs detected<br>• TCE and PCE above PRGs (7 and 39 ug/L, respectively)<br>• Pesticides now ND<br>• As and Mn above PRGs |
| OW-35 | Pesticides near the Contaminated Soils Area detected here | • No organics detected<br>• Mn at 327 ug/L – previously 306 ug/L (similar to historical) |
| OW-37 | Mn detected above the PRG | • Miscellaneous organics detected<br>• Mn similar to historical results |
| OW-38 | A downgradient location from the Oil/Sludge Recycling Area (which had detections of 1,1,1-TCA); Mn detected above the PRG | • 1,4-Dioxane was ND<br>• VOC detections were higher than most other locations<br>• PCE above PRG (14 ug/L)<br>• Carbon tetrachloride at 37 ug/L<br>• Mn similar to historical results |
| MW-208B | BEHP detected above the PRG | • BEHP now below PRG<br>• Mn now below PRG |
| MW-208D | BEHP detected above the PRG | • BEHP now below PRG<br>• Mn above PRG |
| MW-208S | As and Mn detected above the PRGs | • As and Mn detected at magnitudes similar to historical results |
| MW-209B | 1,2-DCA and Mn detected above PRGs | • Both 1,2-DCA and Mn still above PRGs, with 1,2-DCA approximately half of historical results |
| MW-304S | Fill a data gap at the Contaminated Soils Area | • PCE detected (0.085 ug/L)<br>• delta-BHC detected (0.0054 ug/L) |
| MW-304D | Fill a data gap at the Contaminated Soils Area; sample for 1,4-dioxane in the deep overburden flow zone | • Bromochloromethane, PCE, and toluene detected (0.057, 0.34, and 0.46 ug/L, respectively)<br>• 1,4-dioxane was ND |
| MW-304B | Fill a data gap at the Contaminated Soils Area | • 1,1-DCA (0.47 ug/L) and bromochloromethane (0.27 ug/L) detected<br>• bis(2-chloroethyl)ether, butylbenzylphthalate, and naphthalene detected at less than 0.2 ug/L |

| Well ID | Original Selection Rationale (based on historical monitoring data) | Notable Detections and Observations of Winter 2005-2006 Monitoring Round |
|---|---|---|
| **Asbestos Landfill** | | |
| MW-207B | Location upgradient of Asbestos Landfill; historical detections of 1,1,1-TCA and 1,2-DCA | • Miscellaneous VOCs detected<br>• TCE and PCE above PRGs;<br>• 1,1,1-TCA detected at 2.3 ug/L, which is just below the historical detection of 3 ug/L;<br>• 1,2-DCA detected at 2.6 ug/L which is less than half of historical results;<br>• Mn above PRG<br>• 1,4-dioxane at 1.3 ug/L |
| MW-305S | Fill a data gap upgradient of the Asbestos Landfill; 1,1,1-TCA was previously detected in MW-207B | • Miscellaneous VOCs and SVOCs detected – all less than 2 ug/L<br>• 4,4'-DDT and dieldrin detected<br>• Mn above PRG<br>• 1,4-dioxane was ND |
| MW-305D | Fill a data gap upgradient of the Asbestos Landfill; 1,1,1-TCA was previously detected in MW-207B | • Miscellaneous VOCs and SVOCs detected – all less than 5 ug/L<br>• 1,4-dioxane at 1.7 ug/L<br>• 1,2-DCA close to PRG (4.8 ug/L) |
| MW-306S | Fill a data gap upgradient of the Asbestos Landfill | • Miscellaneous VOCs and SVOCs detected, including phenols, phthalates, and PAHs – none above 1 ug/L |
| MW-307S | Fill a data gap at the Asbestos Landfill | • Benzene detected above PRG (6.6 ug/L)<br>• Many VOCs detected, including vinyl chloride (0.66 ug/L)<br>• Miscellaneous SVOCs detected – all below 1.5 ug/L<br>• Mn above PRG |
| MW-307D | Fill a data gap at the Asbestos Landfill | • Many VOCs detected<br>• 1,2-DCA above PRG (11 ug/L) |
| MW-307B | Fill a data gap at the Asbestos Landfill | • Many VOCs detected<br>• 1,2-DCA above PRG (23 ug/L)<br>• As above PRG |
| MW-308B | Check the bedrock aquifer below the Asbestos Landfill | • Many VOCs detected<br>• 1,2-DCA above PRG (8.5 ug/L)<br>• TCE well above PRG (75 ug/L)<br>• Vinyl chloride detected (0.74 ug/L)<br>• 1,4-dioxane detected (2 ug/L) |
| OW-07 | The second highest PCB concentration detected, as well as TCE above the PRG | • PCBs now non-detect (ND)<br>• TCE reduced from 21 ug/L to 4.6 ug/L<br>• 1,1-DCA (0.34 ug/L); chloromethane (1.6 ug/L);and trans-1,2-DCE (0.58 ug/L)<br>• Mn detected above PRG at similar magnitude to historical results |
| OW-08 | Benzene detected, as well as pesticides | • Benzene still detected above PRG, but at 59 ug/L rather than above 300 ug/L<br>• 1,1,1-TCA, 1,1-DCA, and chlorobenzene were previously not detected and are now present at 22, 38, and 46 ug/L, respectively<br>• Other miscellaneous VOCs, including BTEX compounds, detected at low concentrations<br>• Phenol was the only SVOC detected (5.7 ug/L)<br>• Pesticides were ND<br>• Metals detected at similar magnitude to historical results (Mn and As above PRG) |

| Well ID | Original Selection Rationale (based on historical monitoring data) | Notable Detections and Observations of Winter 2005-2006 Monitoring Round |
|---|---|---|
| OW-25 | Tl and Mn detected above the PRGs | • Miscelleanous VOCs detected<br>• TCE and PCE just below PRGs (3.2 and 4.4 ug/L, respectively)<br>• Mn above PRG;<br>• Tl was ND, but the DL was elevated (5 ug/L) above the PRG of 2 ug/L |
| OW-26 | Pesticides detected | • Pesticides now ND<br>• As above PRG |

| **B&M Railroad Landfill** | | |
|---|---|---|
| MW-01 | Check the most downgradient wells | • Two PAHs detected at 0.012 ug/L, no PRG exceedances<br>• No historical results |
| MW-01A | Check the most downgradient wells; sample one deep overburden well for 1,4-dioxane | • No PRG exceedances;<br>• 1,4-dioxane was ND |
| MW-01B | Check the most downgradient wells | • Two PAHs detected; no PRG exceedances<br>• No historical results - Similar to MW-01 |
| MW-01C | Check the most downgradient wells; sample the shallow overburden well for 1,4-dioxane | • No organics detected (including 1,4-dioxane)<br>• No PRG exceedances |
| MW-213B | Multiple chlorinated VOCs detected above PRGs | • 1,1-DCE and 1,2-DCA now below PRGs<br>• TCE still above PRG (16 ug/L), but trending downwards<br>• Metals below PRGs |
| MW-213D | Chlorinated VOCs and Mn detected above PRGs | • 1,1-DCE now ND<br>• TCE now below PRG (4.8 ug/L) – down significantly<br>• Mn now below PRG |
| MW-213S | PCBs and pesticides detected here | • A few pesticides detected<br>• PCBs now ND<br>• Mn above PRG |
| MW-214S | The highest site PCB concentrations were detected here, along with exceedances of PRGs by pesticides, Mn, and As | • Pesticides/PCBs now ND<br>• As and Mn still above PRGs |
| MW-215B | BEHP detected above the PRG | • BEHP now ND |
| OW-35 | Pesticides near the Contaminated Soils Area detected here | • No organics detected<br>• Mn at 327 ug/L – previously 306 ug/L (similar to historical) |
| OW-49 | Close to off-site; downgradient of B&M Railroad Landfill | • 1,2-DCA at PRG (5 ug/L; was previously above PRG)<br>• TCE still above PRG (7.8 ug/L), but a lot lower than historical values (22-25 ug/L)<br>• Mn still above PRG (516 ug/L), but now half of historical results |
| OW-50 | Close to off-site; downgradient of B&M Railroad Landfill; check for 1,4-dioxane in a downgradient location | • 1,4-Dioxane detected (0.59 ug/L) below state MCL<br>• Mn still moderate (1350 ug/L) |
| OW-51 | Close to off-site; downgradient of B&M Railroad Landfill | • As and Mn above PRGs<br>• No historical results |
| PZ-115 | Sample LNAPL | • LNAPL determined to be No. 6 Fuel Oil |

| Well ID | Original Selection Rationale (based on historical monitoring data) | Notable Detections and Observations of Winter 2005-2006 Monitoring Round |
|---|---|---|
| **Old B&M Oil/Sludge Recycling Area** | | |
| MW-202B | Check to see if contaminants migrated out of Oil/Sludge Recycling Area | • No notable detections |
| MW-202D | Check to see if contaminants migrated out of Oil/Sludge Recycling Area | • No notable detections |
| MW-202S | Check to see if contaminants migrated out of Oil/Sludge Recycling Area; check surficial aquifer for pesticide detections | • High detection of carbon tetrachloride (120 ug/L)<br>• Miscellaneous VOCs and SVOCs detected<br>• Pesticides were ND<br>• As above PRG |
| MW-203B | Check to see if contaminants migrated out of Oil/Sludge Recycling Area | • No notable detections |
| MW-203D | 1,1,1-TCA detected | • 1,1,1-TCA still detected, but lower (0.16 ug/L);<br>• No PRG exceedances<br>• 1,4-dioxane at 2.9 ug/L |
| MW-203S | 1,1,1-TCA detected in MW-203D; check surficial aquifer in the area downgradient of the Oil/Sludge Recycling Area | • Mn above PRG<br>• 1,4-dioxane was ND |
| MW-301S | Check the surficial aquifer in the Oil/Sludge Recycling Area for PCBs/pesticides; 1,1,1-TCA detected in the historical MW-201S location | • MTBE detected (3.4 ug/L)<br>• As and Mn above PRGs<br>• 1,4-dioxane was ND |
| MW-301D | 1,1,1-TCA detected in the historical MW-201S location | • MTBE detected (0.21 ug/L)<br>• Toluene detected (0.13 ug/L) |
| MW-301B | Replace destroyed wells upgradient of the Oil/Sludge Recycling Area | • Toluene detected at 0.2 ug/L |
| MW-302S | Check the surficial aquifer in the area downgradient of the Oil/Sludge Recycling Area; screen at the water table to look for LNAPL | • No organics detected<br>• No notable metal detections |
| MW-303S | LNAPL was historically found in destroyed piezometer P-12. Check the surficial aquifer in this area and screen at the water table to look for LNAPL; likely location for LNAPL sample | • Carbon tetrachloride detected (0.39 ug/L)<br>• As and Mn above PRGs<br>• LNAPL not detected |
| OW-37 | Mn detected above the PRG | • Miscellaneous organics detected<br>• Mn similar to historical results |
| OW-38 | A downgradient location from the Oil/Sludge Recycling Area (which had detections of 1,1,1-TCA); Mn detected above the PRG | • 1,4-Dioxane was ND<br>• VOC detections were higher than most other locations<br>• PCE above PRG (14 ug/L)<br>• Carbon tetrachloride at 37 ug/L<br>• Mn similar to historical results |

| Well ID | Original Selection Rationale (based on historical monitoring data) | Notable Detections and Observations of Winter 2005-2006 Monitoring Round |
|---|---|---|
| **Asbestos Lagoons** | | |
| MW-208B | BEHP detected above the PRG | • BEHP now below PRG<br>• Mn now below PRG |
| MW-208D | BEHP detected above the PRG | • BEHP now below PRG<br>• Mn above PRG |
| MW-208S | As and Mn detected above the PRGs | • As and Mn detected at magnitudes similar to historical results |
| MW-209B | 1,2-DCA and Mn detected above PRGs | • Both 1,2-DCA and Mn still above PRGs, with 1,2-DCA approximately half of historical results |
| OW-09 | The highest concentration of PCBs detected here | • VOCs previously detected (1,1-DCA, 1,2-dichlorobenzene, and 1,2-DCA) decreased in concentration;<br>• New VOCs detected all at less than 5 ug/L, with most below 1 ug/L<br>• One pesticide (alpha-chlordane) detected (0.0051 ug/L)<br>• PCBs were ND<br>• High Mn (22600 ug/L) |
| OW-10 | Mn detected above the PRG | • Miscellaneous VOCs and SVOCs detected – none above PRGs<br>• Metals at similar magnitude to historical results |
| OW-12 | 1,1,2,2-Tetrachloroethane detected above the PRG | • 1,1,2,2-Tetrachloroethane now ND<br>• Miscellaneous VOCs, including BTEX compounds, detected at low concentrations (< 2 ug/L)<br>• As above PRG<br>• Mn now below PRG<br>• |
| OW-20 | Pesticides detected and Mn detected above the PRG | • Miscelleanous VOCs detected<br>• TCE and PCE above PRGs (7 and 39 ug/L, respectively)<br>• Pesticides now ND<br>• As and Mn above PRGs |

Notes
1,1,1-TCA – 1,1,1-Trichloroethane
1,1-DCE – 1,1-Dichloroethene
1,2-DCA – 1,2-Dichloroethane
As – Arsenic
BEHP – Bis(2-ethylhexyl)phthalate
LNAPL – Light non-aqueous phase liquid
MCL – Maximum Contaminant Limit
Mn – Manganese
ND – Non-detect
PAHs – Polynuclear Aromatic Hydrocarbons
PCBs – Polychlorinated Biphenyls
PCE – Tetrachloroethene
PRG – Preliminary Remediation Goal
TCE – Trichloroethene
Tl – Thallium
SVOCs – Semivolatile Organic Compounds
VOCs – Volatile Organic Compounds

# TABLE 4-1. EVALUATION OF MODEL-PREDICTED TIMES TO ACHIEVE PRGs [1]

**MODFLOW/MODPATH Pore Volume Estimates**

| AOC / Compound | 1995 RI PRG (ug/L) | 2006 PRG (ug/L) | Years from 1995 to reach PRG at source - Bedrock | Change Since 1995 | Years from 1995 to reach PRG at source - Overburden | Change Since 1995 | Comments |
|---|---|---|---|---|---|---|---|
| **B&M Railroad Landfill** | | | | | | | Mixture of contaminants at this AOC |
| 1,2-Dichloroethane | 5 | 5 | 89 | Concentration below PRG (MW-213B was 9 ug/L, now 4.6 ug/L) | BPRG | | |
| Trichloroethene | 5 | 5 | >200 | ~60% reduction in concentration in 2 wells (MW-213B was 50 ug/L, now 16 ug/L; OW-49 was 25 ug/L, now 7.8 ug/L) | 110 | Concentration No Longer Exceeds PRG (MW-213D was 52.5 ug/L, now 4.8 ug/L) | Max concentrations from downgradient edge were assumed to be at upgradient side of landfill - may have been too conservative |
| Arsenic | 10 | 10 | BPRG | | >200 | Increased (MW-214S was 55.6 ug/L, now 88.8 ug/L; OW-51 wasn't sampled previously, but now 23.1 ug/L) | |
| Manganese | 875 | 300 | >200 | Would have been below old PRG (OW-49 was 1260 ug/L, now 516 ug/L; MW-213B and MW-215B were both, and still are, below PRG) | >200 | Not much of a change (MW-214S was 5420 ug/L, now 4550 ug/L; MW-213S was 2030 ug/L, now 803 ug/L; MW-213D was 922 ug/L, now 224 ug/L; MW-1C below PRG both events; OW-35 was 306 ug/L, now 327 ug/L; OW-50 was 888 ug/L, now 1350 ug/L) | |
| **RSI Landfill** | | | | | | | Primarily metals around this AOC |
| 1,2-Dichloroethane | 5 | 5 | 22 | Concentrations exceed PRGs in MW-307B and MW-308B (see comment) (MW-207B was 6 ug/L, now 2.6 ug/L - upgradient of area) | ND | Concentration No Longer Exceeds PRG in wells sampled in 1995. Concentrations exceed PRGs in MW-307D (see comment) | OW-07, OW-08, MW-307 cluster should not be considered related to RSI LF |
| Benzene | 5 | 5 | ND | | >200 | ~80% Reduction in Concentration (OW-08) (see comment) | |
| Trichloroethene | 5 | 5 | 0* | Concentration was at PRG and still does not exceed PRG | 136 | OW-07 was 23 ug/L, now below PRG (see comment) | |
| Arsenic | 10 | 10 | NC (see comment) | Ranging from just above PRG (10.5 ug/L) to 33.1 ug/L in 1995; MW-212B now 32.9 ug/L | >200 | Similar in magnitude (MW-211D was 345 ug/L, now 281 ug/L) | NC - not calculated - original PRG was higher (50 ug/L) and detections were below |
| Manganese | 875 | 300 | >200 | Similar in magnitude (MW-212B was 2690 ug/L, now 2770 ug/L) | >200 | Similar in magnitude (MW-211D was 6400 ug/L, now 5140 ug/L); MW-210, MW-212, and OW-2 also above PRG | |
| **B&M Locomotive Shop Disposal Areas** | | | | | | | Primarily metals around this AOC |
| Manganese | 875 | 300 | NC (see comment) | MW-205B was at 519 ug/L; not resampled | >200 | MW-204S was 11000 ug/L, now 22400 (note that this location may be considered upgradient of area); other overburden exceedances | NC - not calculated - original PRG was higher (875 ug/L) and detections were below |
| **Old B&M Oil/Sludge Recycling Area** | | | | | | | Except for carbon tetrachloride, just metals at this AOC |
| Manganese | | | >200 | MW-201B was at 1370 ug/L, destroyed; MW-301B at 130 ug/L | 195 | OW-42 was at 1480 ug/L, destroyed; MW-203S at 1010 ug/L | |
| **Contaminated Soils Area** | | | | | | | OW-34-38; MW-208/209; MW-304 (pretty clean) |
| 1,2-Dichloroethane | 5 | 5 | >200 | MW-209B was at 39 ug/L, now 21 ug/L | ND | | Pore flush makes times large |
| Trichloroethene | 5 | 5 | >200 | MW-213B (50 ug/L) was used, but not close to area; no PRG exceedances in area | 164 | MW-213D was used (52.5 ug/L), but not close to area; no PRG exceedances in area | |
| Arsenic | 10 | 10 | BPRG | No change | >200 | MW-211D (345 ug/L) was used, but not close to area; MW-208S was 58.1 ug/L, now 101 ug/L | |
| Manganese | 875 | 300 | >200 | OW-09 (8745 ug/L) was used, but not close to area; OW-37 was 1370 ug/L, now 1390 ug/L; MW-209B was 1140 ug/L, now 1290 ug/L | >200 | MW-214S (5420 ug/L) was used, but not close to area; OW-38 was 1370 ug/L, now 1700 ug/L; MW-208D was 1730 ug/L, now 1690 ug/L | |

# TABLE 4-1. EVALUATION OF MODEL-PREDICTED TIMES TO ACHIEVE PRGs [1]

**MODFLOW/MODPATH Pore Volume Estimates**

| AOC / Compound | 1995 RI PRG (ug/L) | 2006 PRG (ug/L) | Years from 1995 to reach PRG at source - Bedrock | Change Since 1995 | Years from 1995 to reach PRG at source - Overburden | Change Since 1995 | Comments |
|---|---|---|---|---|---|---|---|
| **Asbestos Landfill** | | | | | | | 305/306 upgradient; 307/308 downgradient; OW-28 to 31 upgradient; OW-07/08 downgradient; 207B upgradient |
| 1,2-Dichloroethane | 5 | 5 | 10 | Concentrations exceed PRGs in MW-307B (23 ug/L) and MW-308B (8.5 ug/L) (MW-207B was 6 ug/L, now 2.6 ug/L - upgradient of area) | ND | Concentration exceeds in MW-307D (11 ug/L) | |
| Benzene | 5 | 5 | ND | | 56 | ~80% Reduction in Concentration (OW-08 was 350 ug/L, now 59 ug/L) | |
| Trichloroethene | 5 | 5 | 0* | Concentration exceeds in MW-308B (75 ug/L) | 34 | OW-07 was 23 ug/L, now below PRG (4.6 ug/L) | |
| Arsenic | 10 | 10 | NC (see comment) | Ranging from just above PRG (10.5 ug/L) to 13.3 ug/L in 1995; MW-307B now 10.6 ug/L | >200 | OW-08 at 14.4 ug/L; previous modeling performed on well downgradient from RSI LF | NC - not calculated - original PRG was higher (50 ug/L) and detections were below |
| Manganese | 875 | 300 | >200 | Similar in magnitude (MW-212B was 2690 ug/L, now 2770 ug/L) | >200 | OW-07 was 1830 ug/L, now 2110 ug/L; OW-08 was 967 ug/L, now 567 ug/L; others range from 149 ug/L to 6440 ug/L (upgradient - MW-305D) | |
| **Asbestos Lagoons** | | | | | | | |
| 1,2-Dichloroethane | 5 | 5 | 161 | ~45% reduction in concentration (MW-209B was 39 ug/L, now 21 ug/L) | ND | | MW-209 is barely downgradient |
| Arsenic | 10 | 10 | ND | | >200 | Slight increase in area; MW-208S was 58.1 ug/L, now 101 ug/L; note that MW-208 cluster is upgradient of AOC; 12 ug/L through 23.4 ug/L in other overburden wells | |
| Manganese | 875 | 300 | >200 | Increase; OW-09 was 8745 ug/L, now 22600 ug/L | >200 | Not much change; OW-20 was 4160 ug/L, now 3480 ug/L | OW-20 is barely downgradient |

**BIOSCREEN Estimates**

| AOC / Compound | 1995 RI PRG (ug/L) | 2006 PRG (ug/L) | Years from 1995 to reach PRG at source | Change Since 1995 |
|---|---|---|---|---|
| **B&M Railroad Landfill** | | | | |
| Trichloroethene | 5 | 5 | 35 | ~60% reduction in concentration in 2 wells (MW-213B was 50 ug/L, now 16 ug/L; OW-49 was 25 ug/L, now 7.8 ug/L) |
| **RSI Landfill** | | | | |
| Benzene | 5 | 5 | 54 | ~80% Reduction in Concentration (OW-08 was 350 ug/L, now 59 ug/L; well actually related to Asbestos LF) |

Notes:

[1] Values presented are not meant to be exact, but may be used for relative comparison; values do not include reductions due to active in-situ remedies such as chemical oxidation.

BPRG = Below Preliminary Remediation Goals

No PRG = Risk Based Goal not exceeded and No MCL promulgated

ND = Not detected

* Maximum detection for this AOC was at the PRG